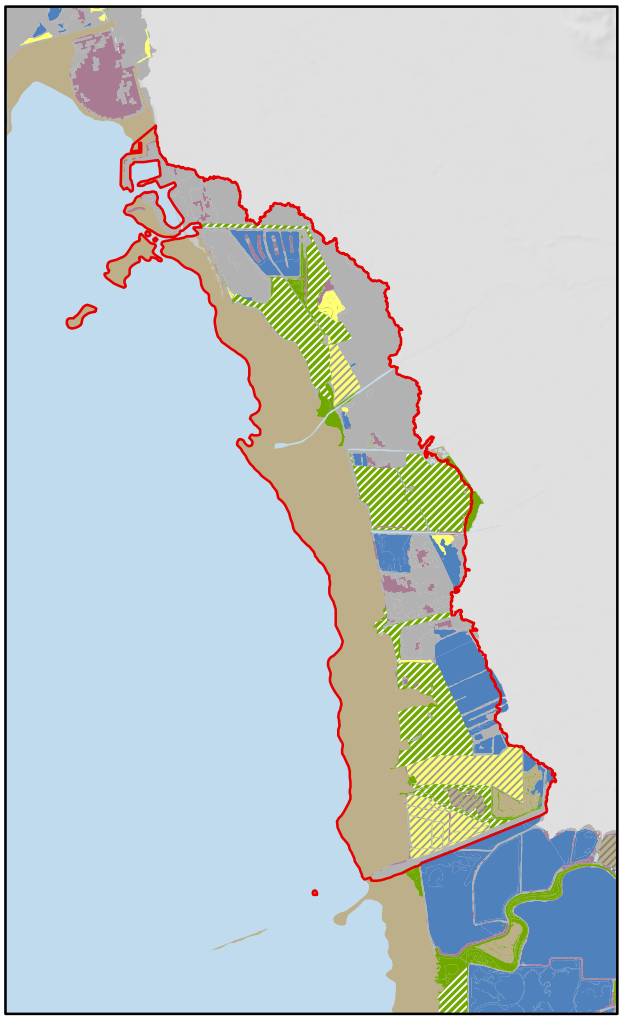
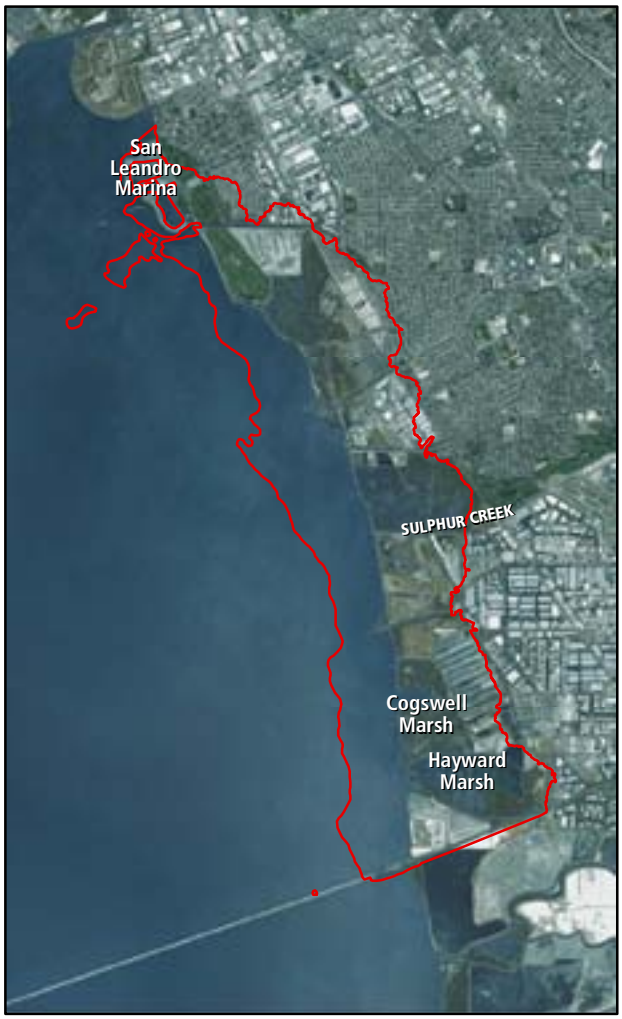
BAYLANDS SEGMENT T





HAYWARD AREA

Eastern edge of San Francisco Bay between Highway 92 and San Leandro Marina

Baylands 2009

- Bay/Channel
- Diked Wetland
- Salt Pond
- Managed Pond
- Tidal Flat
- Tidal Marsh
- Agriculture and Other Undeveloped Areas
- Developed Areas

Red line shows the boundaries of Segment T.

Hatching indicates areas where restoration activities had occurred as of 2009. For managed ponds this included habitat enhancement.

By: San Francisco Estuary Institute

Data: Wetland data from SFEI includes BAARI (v1, 2009) Baylands and Wetlands, NLCD 2006, and wetland tracker data.

Imagery: ESRI World Imagery (updated 2015)

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Unique Opportunities

Segment T offers several opportunities to restore and enhance tidal habitats and to strengthen the linkages between subtidal, baylands, creeks, and terrestrial habitats. Other habitats such as moist grassland and seasonal wetlands adjacent to the Roberts Landing area, as well as several roosting sites, could also be protected and restored. Multiple creeks (Saulfur and others) are already the focus of community-based restoration efforts, and this work could be leveraged with additional activities integrating climate-change-adaptation techniques. The San Leandro Marina, Oro Loma Marsh, and the Hayward Regional Shoreline provide unique, visible opportunities to educate the public about wildlife habitat needs. Conditions at some sites are appropriate for native eelgrass and oyster restoration, and existing eelgrass and oyster beds offshore from Oyster Point Regional Shoreline and Hayward Regional Marsh could be enhanced.

Segment Features and Setting

Most of this segment was historically tidal marsh and large natural salt ponds, including Crystal Salt Pond. Along the foreshore of the bay were narrow sandy beaches near San Leandro and a continuous band of mudflats that became progressively wider moving south. Along the backshore were large areas of freshwater seeps and seasonal wetlands in the extensive moist grasslands. Several willow groves existed adjacent to Sulfur and San Lorenzo Creeks.

In the 1850s, much of the tidal marsh was diked to create land for salt production, and landings were established to move salt and other agricultural products to San Francisco. After salt production ceased in the 1940s, many of these diked wetlands became seasonal wetlands and have been recently restored to tidal action. The area north of Roberts Landing was restored to mostly muted tidal systems (e.g., Citation Marsh) in the 1990s for mitigation. To the south, within the Hayward Regional Shoreline, Cogswell Marsh, the Hayward Area Recreation District (HARD) Marsh, and Oro Loma Marsh represent large systems restored to tidal action in the 1980s and 1990s to improve habitat values. Multiple active revegetation enhancement projects are under way to increase native *Spartina* and marsh gumplant populations at Oro Loma, Cogswell, and HARD Marshes. The Hayward Regional Shoreline also contains multiple managed marsh and pond systems: Triangle Marsh, Hayward Marsh, and a five-basin managed fresh and brackish system that relies on secondary treated wastewater from the Union Sanitary District, Salt Marsh Harvest Mouse Preserve, and Oliver Salt Ponds. Oliver Salt Ponds used to provide important snowy plover habitat. However, the berms are increasingly overtopped, and Eden Landing provides superior habitat.

Today, there is considerable industrial development in this segment, with cities, industrial areas, natural gas lines, wastewater treatment infrastructure, electrical utility projects, creek channelization, residential developments, and transportation corridors. Landfills, managed ponds, parks, the San Leandro Marina, and other developments occupy sites that once were tidal flat or marsh.

Tidal flats still exist throughout most of their historical distribution, and there are several sandy barrier beaches and lagoons. Small fringe beaches and rocky

intertidal areas are present along almost the full length of the segment, and intertidal and shallow subtidal areas support eelgrass, oyster, and macroalgal beds. Some vernal pools remain in the adjacent uplands.

The South Bay's only existing California least tern colony is in this segment on an island in one of the Hayward Regional Shoreline treatment ponds. Snowy plovers also nest on this island, albeit in small numbers and with limited success. A large Forster's tern colony nests on an adjacent island, and a heron and egret rookery is present, although it may have been declining in recent years. The water-treatment ponds have been suffering from repeated outbreaks of avian cholera and avian botulism for the past few years, causing large numbers of dead waterfowl and a possible population decline in the rookery. New management plans for these ponds are being considered by the East Bay Regional Park District.

Implications of Drivers of Change

Sea-level rise will increase the erosion caused by storm surges and wave energy, and increase the depth, duration, and frequency at which baylands are inundated.

The developed areas will become increasingly difficult to protect as sea levels rise but, unlike segment L (Berkeley–Albany), this segment has some adjacent areas at appropriate elevations that could allow for baylands migration. Increasing wave energy will increase the ongoing marsh edge erosion, while increasing inundation coupled with declining sediment supply will lead to a downshifting of bayland habitats and eventual drowning. The water levels and salinities of muted tidal marshes and ponds will become increasingly difficult to manage. Outboard levees in particular will be subject to greater wave action as water depths increase, allowing larger waves to propagate inshore. Increasing wave action will also accelerate the erosion of the small remaining marsh edges, resulting in the narrowing and a potentially complete loss of marshes and other unique habitats such as coarse beaches and rocky intertidal areas. This urbanized segment has a high degree of existing development that directly abuts the shoreline, resulting in limited accommodation space and limited areas for restoration adaptation. There is a need for innovative and experimental approaches that may include sediment placement, the use of uncontaminated on-site fill in restoration designs, and integrated multihabitat designs with multiple biological and physical objectives.

Considerations for Implementing the Actions

Significant restoration investment has already been made along the shoreline. The remaining opportunities involve select areas that could be evaluated to provide tidal marsh and transition zone habitat. The East Bay Dischargers Authority (EBDA) pipeline runs along the back of the Hayward Regional Shoreline from Hayward's Landing to Highway 92, and there may be co-benefits associated with preparing transition zone slopes for landward migration and treating wastewater. Modifying the managed pond systems could also provide for a broader range of habitat and species needs. The fact that the Hayward Regional Shoreline is a recreation destination may bolster public engagement in its restoration. Because the area is managed

by a joint-powers authority (the Hayward Area Shoreline Planning Agency) it may be easier to raise funds, initiate studies, and go through the environmental review process for restoration projects.

NEAR TERM (NOW TO MIDCENTURY, PRIOR TO SLR CURVE ACCELERATION)

In the near term, when sea-level rise rates will still be relatively low, actions enhancing the baylands will provide immediate ecological benefits and maximize their resilience. Low-crested berms could reduce nearshore wave energy, coarse beaches could be created to reduce marsh-edge erosion, and the introduction of fine sediment through mudflat and marsh recharge could increase vertical accretion rates. Generally, restored marshes in this segment have dendritic tidal-channel networks, and the existing habitat is of fairly high quality, but the marsh plains could be further enhanced by active revegetation to speed up tidal-marsh-plant establishment. In addition, the construction of features such as high-tide-refuge mounds or artificial floating islands could be explored to create additional high-tide refugia within existing marsh plains. Living breakwaters could be created around fringing marshes to preserve and enhance unique features like native eelgrass and oyster beds.

This segment is highly urbanized, and landward migration of marsh is constrained by development directly adjacent to the baylands. Major land uses such as the city of Hayward's Water Pollution Control Facility adjacent to Hayward Marsh will need to be protected with approaches that haven't yet been tried locally, such as co-objective projects like the Hayward Shoreline–East Bay Dischargers Authority project noted earlier. Diverse pocket habitats could be preserved, enhanced, and created, then linked together to create a subregional habitat corridor. Vertical enhancements (living seawalls, substrate improvements to docks, etc.) could be made in a few subtidal and intertidal areas where there is hardscape. Many existing habitats could be enhanced by improving tidegate management, removing contaminated soils and derelict boats, and removing trash that ends up in the bay. Habitats could be created

Forster's terns

along flood-control channels, floodplains, and off channels. Low elevation marsh and wetland could be restored. Upstream opportunities are limited but should be included in any plans.

LONG TERM (LATTER HALF OF THE CENTURY, AFTER SLR CURVE ACCELERATION)

In the long term, sea level rise rates will likely outpace vertical accretion rates, and marshes in this segment generally do not have enough space to migrate landward to survive. Prior to that point, a plan for restoring or relocating the functions of the existing tidal marshes should be implemented. Creating wetlands bayward of the flood-protection levees, possibly using wastewater to enhance habitat on the slope, could provide space for landward migration. Simply restoring tidal action to the managed ponds late in the century may result in the creation of deep tidal ponds. To alleviate this, "warping up" the ponds could be undertaken during the earlier part of the century, allowing the accretion of the pond to be managed as well. The planned communities built over former wetlands and bay will be at risk for flooding as sea levels begin to rise. If opportunities for managed retreat become available, options should be pursued to restore areas to baylands or to connected bay habitats.

Recommended Actions

FOR HABITATS AND THE LANDSCAPE IN GENERAL

- Design and restore complete tidal wetland systems, even at a small scale, that include tidal marshes, beaches, and lagoons, broad transition zones, and develop techniques for implementing active revegetation, high-tide-refuge islands, and subtidal habitat restoration.
- Work with willing landowners to protect area landward of tidal marshes to create a transition zone and future tidal marsh habitat where feasible. A few opportunities may exist to acquire private shoreline land along the length of this segment.
- Reduce marsh-edge erosion by creating coarse beaches (with a sand foreshore transitioning to a coarse sand and gravel berm in front of the existing marsh scarp), which could also roll landward as sea levels rise.
- Increase local sediment availability by placing fine sediment in areas that will be reworked by wave and tidal action to increase suspended-sediment concentrations, which could then increase vertical accretion rates.
- Manage water levels in ponds for depth and salinity, and modify water-control structures to accommodate sea-level rise, which may require increasing the sedimentation in ponds (warping) to avoid having overly deep ponds. Ponds may need to be reconfigured or relocated over the long term.
- Create transition zone habitats on gentle slopes in conjunction with flood-risk-management features (or other high-ground areas). Consider transition zone preparation that reuses dredged material or treated wastewater, and encourages tidal-channel formation and pan development, resulting in topographic complexity (high-tide refugia). Fill ponds at the landward edge prior to tidal restoration to create a transition zone.

- Protect, enhance, and restore intertidal and subtidal habitats, including native oyster beds and eelgrass beds.

FOR PARTICULAR WILDLIFE POPULATIONS

- Target the management of ponds for nesting snowy plovers and foraging small and medium-size shorebirds.
- Control invasive *Spartina* before restoring large diked areas to tidal marsh.

Restoration Benefits

Restoring tidal marsh and transition zone habitat could benefit shorebirds and sensitive tidal marsh plant and animal species, as well as provide critical high-tide refugia. The use of dredged material to create the transition zone slopes and the local reuse of treated wastewater would repurpose to the fullest extent possible resources that are currently not reused. Constructing wide terrestrial transition zones landward of existing major salt marsh habitats would significantly improve the resilience of existing Ridgway's rail and black rail populations and their habitats as sea-level rise accelerates. Providing wide terrestrial transition zones would also improve wildlife buffers along trails and offset tidal marsh submergence and the loss of high-tide cover as existing marsh plains submerge. Implementation of the recommendations for this segment would improve habitat support for harbor seals, salt marsh harvest mice, and other mammals.

Enhancing seasonal wetlands would improve high-tide roosting habitat for shorebirds. Enhancing riparian and instream habitats would benefit migratory songbirds and steelhead. Restoring coarse-grained gravel beach habitat at various locations would provide high-tide roosting habitat for shorebirds and terns. Isolated (island-like) marsh-fringing beaches may provide additional nesting sites for terns. The use of treated wastewater to create freshwater and brackish marsh–terrestrial transition zone habitat at sites such as the existing marsh complex at Oro Loma–Hayward Shoreline would provide dense, tall, and extensive high-tide cover for rail species and would attenuate tidal flooding and wave runup. Restoring native oyster and eelgrass beds offshore would provide habitat for birds and fish, and may enhance food and nursery resources for species that use both wetlands and offshore shallow subtidal habitats. Living-shorelines designs may provide wave attenuation, sediment stabilization, and some flood protection in the near term for tidal marsh habitats on the shoreline.

Integrating native oyster and eelgrass restoration adjacent to tidal wetlands, creating living shorelines, and incorporating features such as high-tide-refuge islands could improve small areas of habitat. This would also provide information on how well these approaches succeed and whether they can be scaled up to larger areas in this segment. Such information could be applied to other segment adaptation planning.

Including public education and awareness components in any restoration initiative is critical to building the public and financial support that is needed to test adaptation approaches and work toward large-scale implementation of innovative techniques.

Challenges

Challenges in this segment include Highway 880, an urbanized edge with roadways and infrastructure, railroad tracks, flood-control considerations, exotic predators (e.g., rats and red fox), the potential for oyster drills to limit oyster restoration, invasive *Spartina*, and on-site contaminants. The shoreline has eroding bayfront levees and is crisscrossed with a variety of regionally critical infrastructure, including landfills, wastewater-treatment facilities, storm drainage channels, high-voltage electrical transmission lines, railroads, and freeways. As both sea level and groundwater rise, the risk of levee failure and a resulting damage to these utilities will increase over time. Planning will require coordination among agencies and organizations, including the Hayward Area Shoreline Planning Agency (which consists of the Hayward Area Recreation and Park District, East Bay Regional Park District, and city of Hayward), the Union Sanitary District, the Oro Loma Sanitary District, the East Bay Dischargers Authority, the city of San Leandro, Alameda County, and Union Pacific.